WHAT IS CLAIMED IS:

1. A crystal growth method comprising:

disposing a solution including a solvent and containing a crystal source material in a first chamber defined by an elastomer structure;

disposing a crystallizing agent in a second chamber defined by the elastomer structure;

disposing a material in a well defined by the elastomer structure adjacent to and separated from the first and second chambers by an elastomer membrane; and

placing the first and second chambers in fluid communication to alter a solubility of the crystal source material, such that a presence of the material affects formation of a crystal from the crystal source material.

2. The method of claim 1 wherein the material exhibits a defined permeability to water, such that the presence of the material alters a rate of diffusion of water from at least one of the first and second chambers.

3. The method of claim 2 wherein the material comprises an oil.

4. The method of claim 2 wherein a thickness of the material within the well regulates the rate of water diffusion.

5. The method of claim 1 wherein the elastomer is permeable to a component of the material, such that the material diffuses into at least one of the first and second chambers.

6. The method of claim 5 wherein the component comprises water.

7. The method of claim 5 wherein the material comprises a cryoprotectant.

8. The method of claim 5 wherein the material comprises the crystallizing agent.

9. The method of claim 5 wherein the material comprises the solvent.

10. The method of claim 5 wherein the component comprises an additive other than the solvent and the crystallizing agent.

11. The method of claim 10 wherein the component comprises a cross-linking reagent.

12. The method of claim 10 wherein the component comprises a ligand.

13. The method of claim 10 wherein the component comprises a small molecule drug.

14. The method of claim 5 wherein diffusion of the material occurs during crystal formation.

15. The method of claim 5 wherein diffusion of the material occurs subsequent to crystal formation.

16. The method of claim 5 wherein diffusion of the material occurs across a PDMS membrane having a thickness of about 500 μm or less.

17. The method of claim 1 further comprising irradiating the elastomer to produce a diffraction pattern corresponding to the crystal.

18. The method of claim 17 further comprising physically separating a crystal-containing portion of the elastomer from the surrounding elastomer prior to the irradiation.

19. The method of claim 1 further comprising introducing a cryo-protectant to the crystal.

20. The method of claim 19 further comprising introducing a cross-linking reagent to the crystal.

21. The method of claim 1 further comprising introducing a cross-linking reagent to the crystal.

22. An apparatus for forming crystals, the apparatus comprising:

an elastomer structure defining a first chamber in selective fluid communication with a second chamber, the first chamber configured to contain a solution containing a crystal material dissolved in a solvent, and the second chamber configured to

contain a crystallizing agent, the first and second chambers separated from an adjacent well by a thin elastomer membrane.

23. The apparatus of claim 22 further comprising a substrate in contact with the elastomer structure to define the first and second chambers.

24. The apparatus of claim 22 wherein the substrate is planar and a volume of the first and second chambers is defined by a depth of a recess in the elastomer.

25. The apparatus of claim 22 wherein the substrate comprises a recess partially defining a volume of at least one of the first and second chambers.

26. The apparatus of claim 22 further comprising a cap structure overlying the well.

27. The apparatus of claim 22 wherein the first and second chambers are in selective fluid communication with one another through a flow channel controlled by a microfluidic valve.

28. The apparatus of claim 22 further comprising a material disposed in the well, the material selected from the group consisting of an oil and a solvent-containing species.

29. The apparatus of claim 28 wherein the solvent-containing species is selected from the group consisting of the solvent, the crystallizing agent, a cryo-protectant, a cross-linking reagent, a ligand, and an additive.

30. The apparatus of claim 22 wherein the first and second chambers define a total reaction volume of at least about 500 nL.

31. An apparatus for extracting a crystal from an elastomer microfluidic device, the apparatus comprising:

an enclosure;

a piston slidable within the enclosure and comprising an ejector portion having pins moveable relative to a blade portion having blades;

a loose spring positioned between the blade portion and the enclosure and configured to bias the piston; and

a tight spring positioned between the blade portion and the ejector portion and configured to bias the ejector portion relative to the blade portion.

32. The apparatus of claim 31 wherein the blades exhibit a circular shape and the pins are located within the circle.

33. The apparatus of claim 31 further comprising a handle projecting from the enclosure and configured to allow movement of the piston therein.